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APPLETONS' HOME READING BOOKS

NATURE-STUDY READERS

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HAROLD'S FIRST DISCOVERIES

TROEGER

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EDITED BY

WILLIAM T. HARRIS, A. M., LL. D.

UNITED STATES COMMISSIONER OF EDUCATION

DIVISION I

NATURAL HISTORY

APPLETONS' HOME READING BOOKS

NATURE-STUDY READERS

By J. W. TROEGER

I

HAROLD'S FIRST DISCOVERIES

BY

J. W. TROEGER, A. M., B. S.

NEW YORK
D. APPLETON AND COMPANY
1897

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MARCH 17, 1927

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PREFACE.

THE plan of this series is to begin with objects of interest to children and generally within their reach; to progress from the simple to the more complex; and to pass from features appealing to child mind to form, use, adaptation, and relation; to assist the child in acquiring interesting and useful facts by its own observation, and in utilizing the same to form truer concepts of that which lies beyond observation. Accordingly, the first book contains simple statements of observations which children of six or seven years would be most likely to make, and subsequent books will treat as far as possible the same or kindred subjects in a progressive manner. For instance, the first book touches upon the general appearance of trees, what they need for their growth

and what they give, and treats of the oak, birch, elm, and pine in particular; the second book similarly describes the maple and other common trees not mentioned in the first book, and treats of the growth and uses of different woods; the third book treats of the grain and strength of woods, the structure and function of roots and leaves, including special adaptations; the fourth book considers the great forests and their uses to man; and the fifth discusses trees as a factor in the economy of Nature.

Other subjects will be treated in like manner, such as plants, insects, birds, fishes, mammals, minerals, phenomena of air and water, etc.

It is not intended to treat any of these subjects exhaustively, but to describe pleasing and economic features in such a manner as to interest the child in his environment, to lead him to ask himself questions about things in his surroundings, and to beget in him sympathy with Nature, for

> To him who in the love of Nature holds
> Communion with her visible forms, she speaks
> A various language.

This plan of inducing the child to return to the same subject for further study at different periods of his life can not fail to produce a habit of persistent and continuous observation. Such training is scientific and may well be coveted by young people. Both young and old too often make the mistake of arriving at conclusions based upon insufficient investigation.

Let the habit of noting things about us once be formed, and it will become a means of endless surprises and profit.

New and unknown objects lie in our pathway at every turn. The familiar features in these objects will interest us and lead us on to new discoveries. The known is the teacher of the unknown.

This habit of seeing with the mind will add zest to every jaunt and delight to every drive.

Personification is sparingly used, for children early in life become interested in the facts of Nature, and prefer simple statements of them to mythical personifications.

Those books of science in which the authors have told their own experience, how they advanced step by step in their methods and results of observation, have done most to create a spirit of self-activity. It is for this reason that the first person is so largely used in this series.

That this series may largely contribute to the welfare of our children is the reward greatly desired by the AUTHOR.

LA GRANGE, ILL., *August 20, 1897.*

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SUGGESTIONS.

PARENTS or teachers who know comparatively little about science can successfully lead the children in Nature study, provided they are willing to see with the child. Such often make the best leaders, as their own desire to find out will have a contagious effect.

It is not necessary to answer all the questions that children may ask. Even the wisest scientist would not dare to answer them all. To do that would not be Nature study. *True* teaching is to lead the child to discover as far as possible answers to his own and to the teacher's questions.

Experienced teachers will find ways and means of their own, but a few hints to beginners may not be out of place here.

1. Encourage the children to bring you seed pods, flowers, leaves, butterflies, and other objects, and if you show your appreciation of their efforts and take care of the specimens as though they amounted to something, they will hunt far and wide and bring many good things.

2. Better still, take walks with the children or ask questions, the answers to which they can find on their way to and from school.

3. Provide vases and wide-mouthed bottles for flowers; boxes for seeds and rocks and nuts; cards for mounting pods and insects; a few plant pots in which to set some in-

teresting wild flowers about to blossom and that have been dug up with the soil so as to watch their growth. Flowers, leaves, and the like brought by children should not be bunched together, but arranged and put into several vases so as to show off best the harmony of color and form. Tinted autumn leaves can be grouped on cards or made into borders, etc.

4. Live animals can be brought into the school, made comfortable, and their ways and habits observed with interest and profit. Good order can be maintained by a few wise remarks on the part of the teacher.

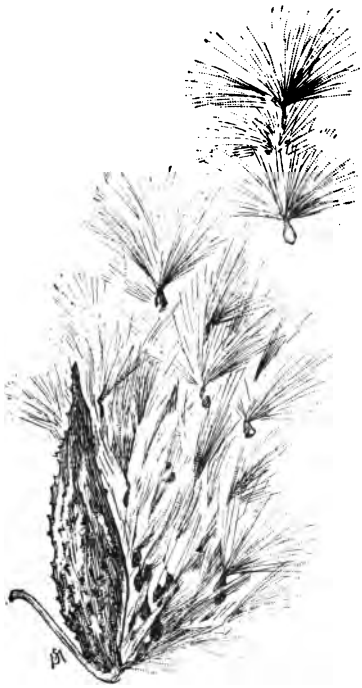
5. No one sees objects in all or even their most interesting aspects at first. Therefore the order should be observation, expression, and more observation.

6. Little time should be given to that which every one knows, but even very common objects may present interesting questions. Every one knows that an apple is round, but few have observed facts that will aid in answering the question why it is round.

7. With those who are beginning to read careful preparation should be made. The child should observe the objects and become familiar by means of blackboard drill with the sentences in the lessons before attempting to read them in the book. This preparation must be full of life and interest to the child. The basis of every lesson should be personal observation by the child. The observation may have been made some time previous to the lesson, but if not, the object should be before the child for examination.

8. Lead the child to distinguish between what it actually observes and what it infers, and to reason step by step to correct conclusions.

9. The lessons in the book follow the seasons and call for materials which may easily be obtained, but the teacher should take up each subject at the time when it is most convenient to make the necessary observations.



Milkweed.

THE BABY IN THE POD.

Good morning, little seed.
I am glad to see you.
How did you come?
"I can float in the air.
You can not float in the air."
Little seed, where do you live?
"I live in the pod.
The pod is my house.
My house is brown inside.
It is gray on the outside."
Do you live alone in your house?
"Oh, no; I have many sisters.
They are at home in the pod."
Here is the pod.

See the little sisters.
See them come out of the pod.
Little seed, you look like a baby.
I like your long, white dress.
It is fine and silky.
Wake up! wake up! baby.
Come out of your house.
Let us toss you up.
Up you go, away you float.
Little seed, what is your name?
"My name is Milkweed.
I grow in rich soil.
Will you come to see me?
I have a red dress in summer.
Do you think it is pretty?"

MISS THISTLE.

Thistle flower.

Here is Miss Thistle.
See her float in the air.
Up she goes, down she comes.
Can you catch her? Let us try it.

Where did you live, Miss Thistle?
I saw your home. It is in the field.
Miss Thistle's house is gray. It was green in July.
The outside has prickles.
The inside is full of baby seeds.
Every seed has a little plume.
The plume is purple at the top.
The plume is a pappus.
The ripe seeds have white pappus.

See the little sisters.
See them come out of the pod.
Little seed, you look like a baby.
I like your long, white dress.
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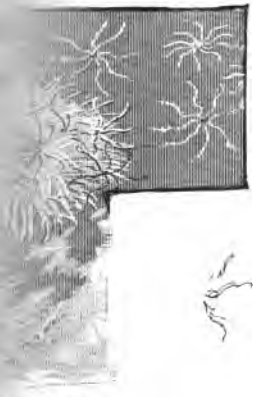


tle down.

MISS THISTLE'S STORY.

"My name is Blessed Thistle," said she.
"How did you get that name," piped the boys and girls.
"I will tell you," said Miss Thistle.
"Once a little girl was very, very sick.
'What shall I do?' said her mamma.
'My little girl can not get well.'
Then an old lady made her some thistle tea.
The little girl soon got well and called me Blessed Thistle.
The bumblebee likes me, too, and comes to see me often.
I give the bumblebee sweet honey.
She gives me yellow dust from other thistles.
This dust makes my seeds good.
I have a purple dress in summer to please the bumblebee."

THE DANDELION.

Dandelion means lion tooth.

Look at the leaves. Can you tell why it has that name?

The dandelion grows in almost every grass plat in the city and out of it.

Little dandelions, you look like golden stars in the green grass.

Were you naughty stars in the sky?

And did the moon send you down to the earth?

Are you not glad to be little stars here?

The sun will help you shine in the green fields.

Fall dandelion.

Shall we look at the blossoms?

I watched one of them for some time.

The flower had a short stem.

"I am as pretty as any flower in the field. Don't you think so? Don't I look like a green pan full of sunshine?"

The flower closed up at night.

It turned the green edge over the yellow part.

In the morning it was up with the sun.

One day the sun was very hot. Then the flower turned the green rim over the yellow part.

The green bracts cover the blossom so that the sun can not wilt it.

Why is the blossom closed at night?

Is it to keep the sunshine in or the dew out?

In about a week my flower went to sleep. The tiny seeds were safely put to bed.

I saw the blossom no more.

In a week the stem began to grow very fast.

It was taller than the grass around it.

The blossom had become a soft, white ball. There were many seeds in one head.

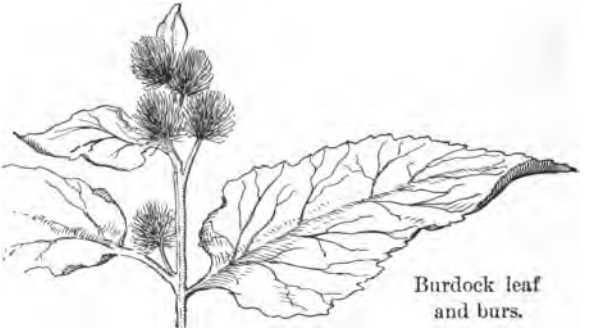
Every seed had a long beak. At the end was a tuft of fine hairs.

Isn't it fun to blow them off and say, "Does your mother want you?"

Some of the boys said, "What time is it?"

My mother boils the young leaves. She calls them "greens."

They taste bitter, but I like them.



Burdock leaf and burs.

THE BURDOCK.

The burdock is a large weed.
It has large, broad leaves.
Its flowers are small.
They are pink or purple.
They are in a bur.
The bur is like a ball with prickles.
The prickles are small hooks.
There are many burs on one plant.
Do you know what these burs are for?
They hook in our clothes. This is the way the seeds travel.
The seeds do not go one by one. They go together in the bur.

The seeds of the dandelion go singly; so do the seeds of the thistle and milkweed.

The burs hook on the tail of a dog or of a cow, or in the wool of a sheep.

The boys and girls make baskets and chairs of the green burs.

The leaves are sticky. They smell bad and taste bitter.

The under side of the leaves is covered with fine hairs.

The lowest leaves are heart-shaped. How are the upper ones?

The burdock has a stout stem and a long root.

Can you pull it out of the ground?

I know of other plants with burs. Do you?

The cockle has burs; it has two burs in a bunch.

My cocklebur has only four seeds in it.

How many has yours, Fred?

I think the burdock prickles stick better, don't you?

The burdock seed has a pappus, but the cockle seed has none.
My burdock flower has no pappus.
I think the pappus falls off before the seeds get ripe.
Is the burdock of any use?
It grows by the wall in the garden.
The farmer cuts it down.
"It's of no use," says he.
But a little frog hops under its broad leaves.
It is cool and dark there.
The frog says, "It's good for a home for me."

THE OAK TREE.

Here is an oak tree.
Isn't it tall? I think it is taller than the house.
This oak has a large stem.
We call the stem of a tree the trunk.

The oak in summer

The trunk of the oak is so large I can not reach around it.

Joe, take my hand. See! both of us can just reach around the trunk.

See the long branches. I see six large branches.

How many do you see?

How crooked the branches are!

The large branches have many small ones.

The small branches have twigs.

What a pretty head this tree has!

The leaves and branches make the head.

What is the shape of the head?

"I think it is the shape of a bell," said Fred.

Isn't it the shape of a cone?

Why is the tree so tall?

Why do its branches spread out so far?

I think the leaves like the sunshine.

They want to be above the grass and above everything.

The leaves want the air too.

See how they dance in the wind.

Don't they look happy?
The leaves catch the sun.
See the shadow on the ground.
The leaves cover all the space so the sun can not get to the ground.

Red oak.

Shall I put a swing on that branch?
Oh, yes; what fun to swing in the shade!
You are very kind, Mr. Oak, to give us the cool shade.

THE LEAVES.

Shall we look at the oak leaves?
See, this one has seven points or lobes.
Here is one with nine lobes. The lobes are rounded.
The lobes are not all alike.
I see a big vein in my leaf.
Yes, and I see a vein in each lobe.
The veins hold the leaf in shape.
I think the sap comes through the veins into the leaf.
It makes the leaf grow.
It keeps it green.
The sap comes up in the trunk.
It comes from the roots.
The roots get the sap from the ground.
The sap is the blood of the tree.
When the roots send no more sap to the leaves, they begin to die.
When the leaves die they turn yellow.

Some turn brown. A few oak leaves turn red in the fall.

I think the young leaves are red and woolly in the spring.

THE ACORN.

This large oak tree bears seed.

The seeds are acorns.

The acorns are in a little cup.

This twig has two acorns.

Some twigs have only one acorn.

Do you like to eat acorns?

Some oak trees have bitter acorns.

Some acorns are in deep cups.

Acorns are good food for hogs.

The squirrel likes the acorn.

He carries them into his home to eat in winter.

I put an acorn in water for a few days.

Then I took the shell off.

The seed was in two parts.

I saw a little tree on one of the parts.

I would like to plant an acorn in a box of earth and see it grow.

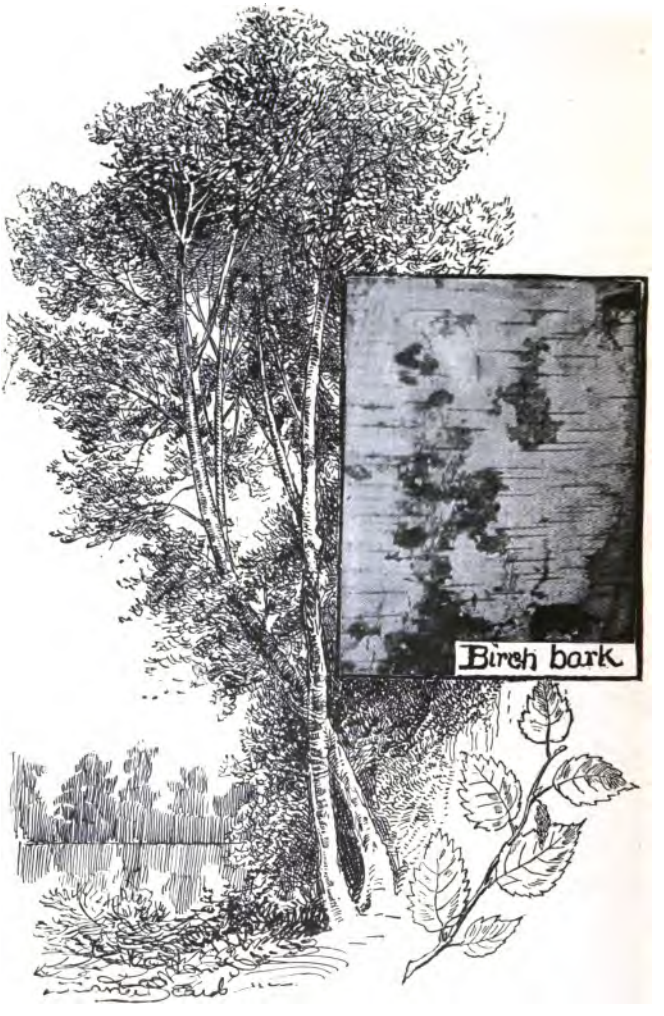
THE KING OF TREES.

The oak tree grows to be very tall and old.
The winds can not blow it down.
Its great roots take fast hold in the ground.
I think it is the king of the forest.
The Indians liked the oak.
They did not want to cut it down.
Some old oaks are hollow.
Some people think fairies live in hollow oaks. Do you think so?
I know the squirrel lives in the oak.
I have seen his nest in the hollow trunk.

A WALK.

We went to the woods in November.
The sun was shining, but the wind was cool.

White clouds floated in the sky.
We saw a blackbird and two blue jays.
The ground was covered with leaves.
Some of the trees had only a few leaves left.
The oak tree had the most leaves.
Now we can see the branches of the trees.
They look like long arms.
I like to look at them.
Do you think the branches feel sorry that their pretty leaves are gone?
We took some soil home.
I put my soil in the window.
I put some water on it every day.
Twenty little plants came up in my soil.
The seeds were in the ground under the leaves.
I think the leaves keep the seeds warm in the winter.
I found bits of rotten leaves in my soil.
I think the leaves rot and make the soil rich.



Birch tree.

We saw the milkweed. There were dry pods on it. The baby seeds had gone.

THE BIRCH TREE.

We saw a pretty white tree in the valley.
It was a tall tree.
The branches were near the top.
They were not very large.
This tree had a small top.
The bark on the trunk was white.
Spots of moss may be seen on some birch trees.
The birch tree is very pretty.
It is called "The Lady of the Forest."
I could peel the bark off.
The outside bark is as thin as paper.
It is light and tough.
Water does not go through it.
The name of this tree is Paper Birch.
The Indians made boats out of birch bark.
Hi-a-wa-tha had a birch canoe.

I like the elm tree. It is tall and has strong branches.

What shape do you think it has?

Some elms are very old.

Many people plant elms for shade trees.

The American elm.

GROWTH OF THE TREES.

I cut five twigs from the ash tree.
I could see the new growth.
It is at the end of the twig.
It looks lighter than last year's growth.
There was one inch of new wood on two of the twigs.
There were two inches of new wood on another twig, and an inch and a half on two others.
Then I cut five twigs from the willow tree.
The new wood on the five twigs of the willow tree was four and one half feet in all.
The new wood of the five ash twigs was only seven inches in all.
The willow grows faster than the ash.
I want to cut some twigs from the oak and the elm, to see how much they grow in one year.

WHAT TREES NEED.

The roots grow in the ground.
They hold the tree up.
The roots can not grow well in stony ground.
The ground is soil.
When the soil is good the tree grows fast.
Trees can not grow without soil.
The raindrops sink into the ground and make it moist.
The roots drink the water.
The roots have tiny mouths.
The mouths are at the end of the little roots.
The roots take in plant food with the water.
They make sap out of the water and plant food.
The sap goes up the trunk of the tree.
It goes into the branches and leaves.

Some of the water in the sap goes through the leaves into the air.

The leaves have little holes on the under side.

The tree breathes through these holes.

Can you see these holes?

SUNLIGHT.

I set a plant in a window and another one in a dark place.

The plant in the dark place did not grow well.

Its leaves changed to a light green.

The plant in the window had dark-green leaves.

After awhile it had buds and flowers.

The plant in the dark had no buds or flowers.

Can you tell why?

There was a tree in a cornfield.

The corn under the tree was very small.

There are three apple trees in my garden.

They shade the plants near them part of the day.
These plants are much smaller than those in the full sunlight.
I think plants need the sunlight.

HEAT.

A little girl had two lilies.
She set one in a warm room and the other in a cold room.
The lily in the warm room grew very fast.
The lily in the cold room did not grow.
Can you tell why?
When do trees and plants grow faster, in warm or cold weather?
Do you think trees and plants need heat?
The sun gives heat to the trees.
He warms the earth in spring.
Then the trees begin to grow.
Trees need soil, water, light and heat.
Is that all they need?

I think they can not grow without air.
Once I put a glass jar over a small plant.
No fresh air could get to the plant.
The plant soon stopped growing.
In two weeks it wilted.

WHAT TREES GIVE.

We have seen what trees need. What do they give?
Let us find out.
Did you ever rest under a tree on a hot day?
"Yes. In the summer I often sit under a tree."
The tree gives shade. It is cool in the shade. It is hot in the sun.
The cows and sheep like the shade of the trees.
Where is the home of the birds?
Many birds make their nests in the trees.

They like to hide among the leaves.
They find bugs and worms on the trees.
Birds like to sit in the trees during the rain.
There is a large tree near my house.
The robin sits in it in the early spring morning.
I love to hear him sing his song. He sings to his mate.
The maple tree has sweet sap in the spring.
It lets us have some of the sap. The sap makes maple sugar.
I like maple sugar very much.
The trees also give us soil.
The dead leaves rot and mix with the earth.
They make rich soil.
The pine tree gives us good lumber.
The oak tree gives us hard-wood lumber.
Can you tell what lumber is used for?

The trees give us wood to burn. The maple tree makes the best firewood.
The trees need soil, water, heat, light and air.
They give shade, a home for the birds, lumber, fuel and soil.

THE FALLING LEAVES.

Little leaf, why do you fall?
"I have done my work on the tree and I want to cover the ground.
I warm the tiny seeds all winter."
How pretty you are! Some of you are red, some are yellow and some are brown.
Look at this twig. Here the leaf held on. See the tiny bud in its place.
I think the bud made the leaf fall.
Jack Frost makes the leaves fall faster. He makes them very beautiful.

The oak in winter.

We say the trees are shedding their leaves. They are getting ready for the winter.

The sap goes down into the roots. In the spring it will come up again.

Then the tiny buds will become new leaves.

The buds are covered with brown scales. The scales keep the buds from getting wet. They keep them warm too.

I saw many, many leaves on the ground under the trees.

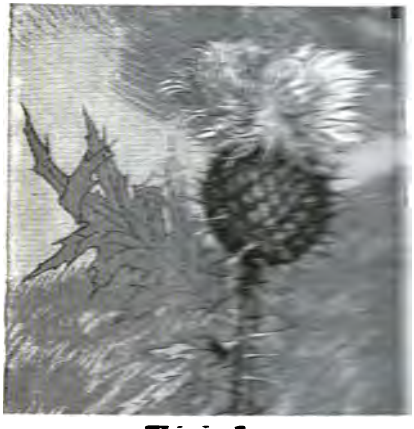
The little seeds in the ground will be glad for them. The leaves will make them a warm bed for the winter.

Pussy's fur is growing longer. She does not shed it now. She is getting ready for the winter too.

We put on woolen clothes in the winter to keep us warm.

See the little sisters.
See them come out of the pod.
Little seed, you look like a baby.
I like your long, white dress.
It is fine and silky.
Wake up! wake up! baby.
Come out of your house.
Let us toss you up.
Up you go, away you float.
Little seed, what is your name?
"My name is Milkweed.
I grow in rich soil.
Will you come to see me?
I have a red dress in summer.
Do you think it is pretty?"

MISS THISTLE



Thistle flower

Where did you live, Miss Thistle
I saw your house
Miss Thistle's house was green
green in July
The outside has prickles
The inside is full of many seeds
Every seed has a little plume
The plume is purple as the sky
The plume is a pappus
The ripe seeds have white feathers

THE TIMID LEAF.

The leaves danced all summer in the sunshine.

One day the wind said to the little leaves, "I will soon pull you off."

One little leaf began to cry.

The twig said to the leaf, "What is the matter?"

"The wind just told me," said the little leaf, "that he would pull me off and blow me far away."

The twig told the branch and the branch told the tree.

The tree laughed until it shook all over and sent word to the little leaf:

"Don't be afraid; hang on and you shall not go until you want to."

So the little leaf went on singing and rustling in the wind.

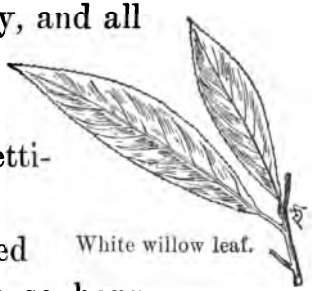
By and by, when the leaves had done their work, they put on their fine dresses.

Then the little leaf wanted to go.

The bud of the new leaf began to grow.
When a puff of wind came, the bud pushed the old leaf off, and the wind laid it softly to sleep behind the rosebush.

THE LEAF PARTY.

One day we were out among the trees.
It was a windy day in the fall.
What do you think we saw?
I will tell you.
There was a little spot where there were no trees.
We saw many leaves come to this spot.
They danced round and round.
And why do you think they came there?
They had a little party, and all the leaves were invited.
They came in their prettiest dresses.
They rustled and danced around, they were so happy.



White willow leaf.

There were Miss Oak and Miss Maple and Miss Elm and tiny Miss Willow and ever so many others.

They seemed to have a real good time.

Did you hear them sing and chat and play games?

You must see for yourself and find out.

When the party was over the wind danced them off into the hollows and bushes where the snow covered them up and they went to sleep.

THE PEACH.

The peach is round like the apple.

It has only one dimple.

I like to feel the peach.

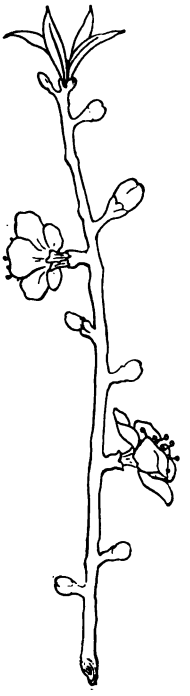
The skin is thin.

It is covered with soft down.

Why is the down on the peach?

I think it keeps off little bugs, don't you?

The peach is yellow; it has a red cheek.
Did the sun give the peach a red cheek?
Was the red cheek toward the sun?
The unripe peach has no red cheek.
The sun tells us when the peach is ripe.
The sun gives the cherries
a red color.
It makes the grape purple.
Is not the sun kind to tell
us when the fruits are
ripe?
The skin covers the pulp.
The pulp is soft and juicy.
There is a seed in the pulp.
This seed looks like a nut.
It is called a stone.
The peach is a stone fruit.
The plum is a stone fruit.
Can you think of other
stone fruits?
Can you crack the stone?
The seed tastes bitter.



Peach blossom.

If you plant the stone the seed will grow.
The damp ground wets the stone.
Then the little seed can grow. It becomes a little tree.
Shall we plant a peach stone?
The peach has pretty pink blossoms.
They come early in the spring.
They come before the leaves do.
When a peach tree is full of blossoms it looks like a large pink ball.
Soon the light-green leaves cover the tree.
The blossoms become little green peaches and hide among the many leaves.

THE GRAPE.

I have a bunch of grapes.
It has many berries. I can count them.
The berries have a thin skin.
The pulp is inside of the skin.
The pulp is soft and juicy.

There are four seeds in my berry.

Do you like to eat grapes?

The birds like the grapes too.

How do they know when they are ripe?

I can pick a basket of grapes in a short time.

My papa gives me five cents for picking a basketful.

There are eight pounds in this basket.

These grapes are purple. Some grapes are red, others are green and have thick skins.

Grape vine.

Which do you like best?

Is the color in the skin or in the pulp?

The juice has no color; it is colorless, like water.

What is the white powder on the grapes?

I think it is plant wax. There is much of this wax on the cabbage leaves.

I put some grapes covered with this powder in water, but the water did not stick to them.

Then I took a bunch and rubbed the powder off with a cloth.

When I put them into the water, the grapes got wet.

I think the wax does for the grape what paint does for a board.

It does not get wet so easily and does not rot so soon.

Grapes grow on a vine. The vine climbs on a frame.

Wine is made from the juice of grapes.

THE APPLE.

John and his sister Mary were at the store.

They got some apples. They paid ten cents for them.

John ate one apple and Mary ate one.

John's apple was red and Mary's was green.

Miss Maiden Blush.

The apple has a smooth skin. If the skin is rubbed it becomes shiny.

The skin has a little oil in it. When the apple gets old this oil makes the skin sticky.

The apple has a stem. The stem is woody. It is strong. It holds the apple on the tree. The stem is one inch long.

Sometimes the apple has a dry blossom on the other end.

John's apple had a fine, juicy pulp.
Mary's apple had a mealy pulp.
John cut his apple crossways. The center looked like a star.

Sir Peary Bartlett.

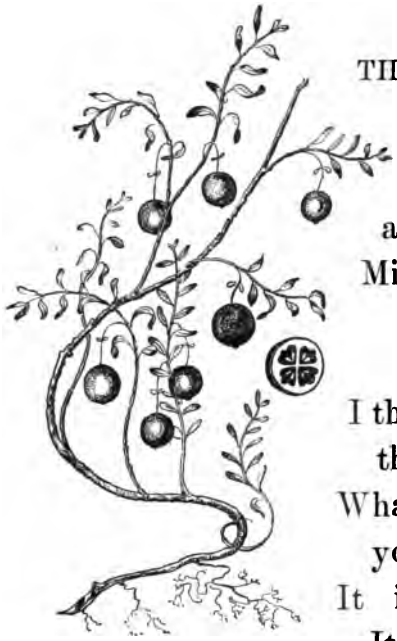
Mary cut her apple through the blow end.
"Oh! look here, John," she said; "see how these seeds lie!"
The seeds are pear-shaped. Which way does the point lie?
There are scales around the seeds. They are the core of the apple.
A ripe apple has brown seeds.
An unripe apple has white seeds.
The seeds have two skins. Can you find them?
The inside skin is white.
Is the pear like the apple?

No, it is not like the apple. Its pulp is more juicy.
It has a core like the apple.
The crab apple is sour. It is smaller than the apple.
The crab apple makes good jelly.
The apple, the pear and the crab apple are core fruits.
The apple is one of the best fruits.
It can be used in many ways.
Can you name some of them?

II.

The apple grows on a tree.
Can you tell why it grows up so high?
The apple grows for the little brown seed.
The unripe apple is green and hard and bitter.
The little seeds do not want to be eaten.
They want to get ripe.
So they hide themselves in the bitter apple.

Do the boys like unripe apples?
Not very well. They make them sick.
The birds do not like the unripe apples.
So the little seeds are quite safe.
They may grow until they are ripe.
When the little seeds are brown and ripe they want to go away.
The sun gives them a soft and juicy pulp.
Then the boys will eat them and throw the core away.
Do you know why the apple is round?
I think I do. It is round so that it can roll away when it falls from the tree.
The seeds can not grow under the mother tree.
They want to get away to sunny ground.
Do you think that is why the peach and orange are round?
I think our apples came from the wild crab apple which grows in the woods.
The wild crab has seeds like our apples but it is very sour.



The cranberry.

THE CRANBERRY.

Does this cranberry look like a small red apple?

Mine is not all red. It has little red spots.

I think the sun made these spots.

What is the shape of your berry?

It is almost round. It is longer one way than the other.

It is an ovoid.

The stem end has no dimple.

I can not pull the skin off. Can you?

Let us cut one of the berries this way.

Do you see the hollows? The seeds are in the hollows.

Now you may cut one crossways. What do you see?

I see four holes in each half. Their shape is like a four-leaf clover.

How many seeds in each little nest?

In this one I see four seeds. Mine has eight seeds.

The cranberry is white inside.

My berry has a red spot in the center.

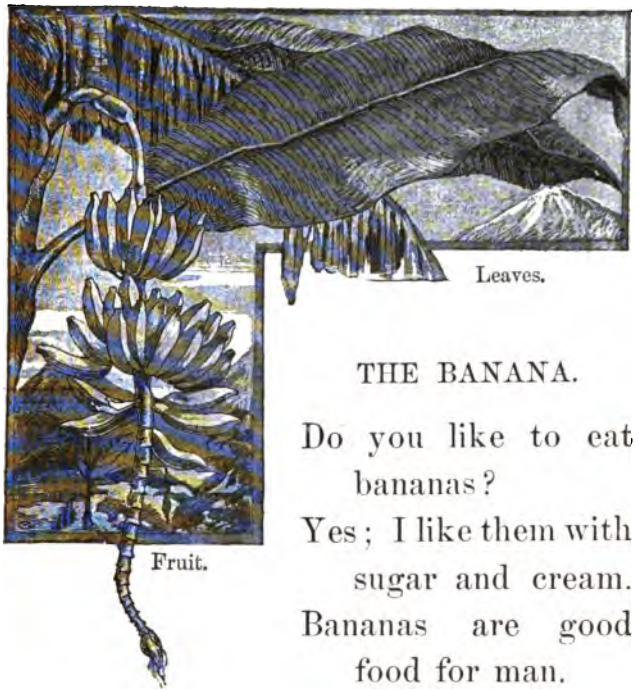
The cranberry has no smell. It tastes sour.

The cranberry is good to eat.

It grows on vines. The vines are the branches of a shrub. The cranberry shrub grows best on low land.

Some poor boys and girls get a living by picking cranberries.

Cranberries get ripe in the fall. They are put into barrels and sent to the towns.



Leaves.

Fruit.

THE BANANA.

Do you like to eat bananas?
Yes; I like them with sugar and cream.
Bananas are good food for man.

The fruits have a thick, soft skin.

The pulp is mealy. It is in three parts.

Each part has two rows of seed dots.

The dots look like seeds, but they are not seeds.

The banana plant has no seeds.

The new plants grow from the roots of the old plants.

The banana blossom is top-shaped.

It is as large as a man's fist. Its color is a beautiful purple.

The banana tree is about ten feet high.

The banana plant is called a tree, but it is not like our trees.

It looks like a calla lily, but it is many times larger.

Each tree bears one bunch of bananas and then dies.

The fruit grows in clusters.

Each cluster is called a "hand" and the fruits are called the "fingers."

Can you tell why these names are used?

Our cluster has only ten fingers. I have seen "hands" with fifteen fingers.

Some bunches have ten hands. I saw some with twenty hands.

Bananas are cut from the tree when they are green.

They grow in warm countries far away.
It takes two weeks to ship them here.
They ripen on the way.
A large banana leaf is a foot wide and eight feet long.
The people use them for roofs and for beds.

THE ORANGE.

The orange is almost round. It is an ovoid.
It is a kind of berry.
At the stem end is a small disk.
I can pull the disk out.
Are all oranges alike at the blow end?
The orange has a rough rind. The oil-sacs make the rind rough.
I like to smell the oil in the sacs. Can you press some of it out with your thumb nail?
It is the orange oil.

Some oranges are quite smooth. The smooth oranges are not so hard as the others.

The orange.

Can you peel the orange with your fingers?

The rind is white and soft on the inside.

The orange has a sweet pulp. It is good to eat.

I think the rind protects the pulp and the seeds in the pulp.

The pulp in my orange has ten parts.
Here is one that has only eight parts.
There is a thin skin between the parts.
The parts are called sections.

An orange grove.

This orange has only five seeds. How many has yours, Fred?

Mine has sixteen good seeds and many tiny ones. See them.

What shape are the seeds? The small end lies toward the center of the orange.

In this part are three seeds, side by side. This one has no good seeds.

The seeds have a white skin. Can you take it off?

The seed tastes very bitter.

The orange grows on a tree. It is an evergreen tree.

The blossoms are white and beautiful. They smell sweet.

Oranges grow in warm countries. They can bear only a little frost.

The lemon is much like the orange, but it is not round. What shape has it?

It also grows on an evergreen tree and only in warm countries.

THE PINE TREE.

Oh, dear, how cold the wind blows!
Let us run behind the pine tree.
How much warmer it is here.
I do not feel the wind. Do you?
How kind you are, Lady Pine. You spread your branches out like arms.
You keep your leaves all winter.
And I am sure it must be that you want to give a warm home to the little birds.
You are a tree of the winter.
You seem to be full of life all the year round.
Other trees had to give up their leaves.
But you may keep yours all the time.
Your leaves are needles.
This pine tree has its needles in pairs.
Each pair is in a little sheath.
The needles grow along the small branches.
Some pines have their needles near the end of the branches.

The white pine.

The white pine has five needles in a bunch.

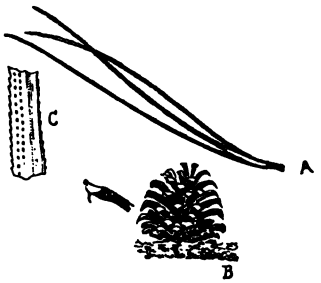
The needles of the white pine are quite thin.

The pitch pine has three and the yellow pine only two needles in a bunch.

Some needles are two inches long, others are four inches long.

I have seen pine needles a foot long.

How long are those on your branch, Jane?



Northern pitch pine. Needles at A, cone at B, magnified needle at C.

This pine tree has small cones.

Can you find the seeds in the cone?

Oh, yes. How many are there?

The cones of the yellow pine are longer than the cones of the pitch pine.

We put some cones into the fire. They will burn very well.

Will the green needles burn?
I will find out.

THE STORY OF A LITTLE PINE TREE.

Once there was a little pine tree in the woods.
It had pretty needles, but it wanted leaves.
It wanted gold leaves.
The next morning when it awoke it had gold leaves.
It was very happy. It said, "See my pretty leaves."
Soon a man came with a bag and took all the gold leaves away.
Then it was very sorry, and said, "I want some glass leaves."
The next morning it had glass leaves.
How pretty they looked in the sunshine!
And the little pine tree was happy again.
Then the wind began to blow, and the little leaves were all broken.

Poor little pine tree! it was very sorry again.

Now it wanted green leaves like the other trees.

So the next morning it had green leaves.

Then a goat came with her kids and ate all the green leaves.

Then the poor little pine tree said, "I want my own needles again."

So the next morning it had its own needles, and it was happy all the time.

WATER.

See, here is a drop of water.

I can make many small drops out of it.

I'll put my pencil point in the drop and then on the slate.

One, two, three, four, five. Oh, there are ever so many tiny drops.

When they are in the big drop they stick together.

See, I can stretch the drop.

Soap bubbles in dish.

Let us put a little soap in the water.

Now blow bubbles in it.

How pretty! See the rainbow in every bubble.

The little water bits stick together.

They make a film.

The film is the outside of the bubble.

There is air inside.

I can blow soap bubbles in the air.

Are they soap bubbles or water bubbles?

Of what use is the soap in the water?

Why does the film break in a little while?

VAPOR.

I will now put a little water in a pan, and set it on the stove.

You may put another pan in the window.

I see a cloud on the water in the pan on the stove.

Hold your hand over it.

See the tiny drops on your hand.

Are they bubbles too? I think so.

The bubbles are very small.

Shall we call them water dust?

The water dust goes into the air.

The water in the pan is all gone.

The pan in the window will soon be empty too.

We say it dries up.

The water goes into the air.

See, your dress is wet.

The water on the dress will soon go into the air.

You dear little drops, I must call you fairies.

You hide yourselves in the air.

I can not see you.

Vapor rising from dish of water.

Here are some of you on the window pane.

Joe, put your mouth near the pane.

The fairies came out of your mouth.

Did you ever think of it?

Is that why we want to drink water?

Do they come out of everybody's mouth?

The air is full of tiny water fairies.

See the clouds in the sky.

The water fairies have gone up there.

There are so many that the sun can not shine through them.

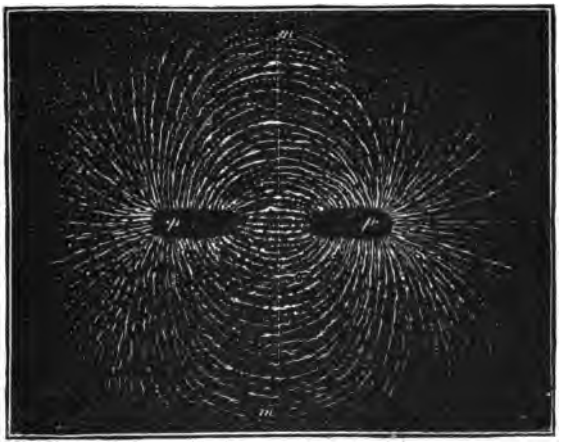
FROST.

It is getting cold.
Jack Frost makes the window panes cold.
He gives the water fairies white caps.
They are going to sleep on the pane. What pretty pictures they make!
This looks like a flower.
Here is a pine tree, and here is a big house.
Are the water fairies outdoors too?
Yes, indeed; and while we sleep Jack Frost will put them to sleep, too, in their white hoods.
I saw them on the trees and walks.
I saw them on everything.
They will wake up when the sun shines warm again and hide in the air.
These water fairies are called vapor.
They like to hide in the warm air.
Only a little vapor can hide in the cool air.

THE MAGNET.

Pens stick to the magnet.
I can pull them off.
The magnet draws the nail to it. The nail sticks to the magnet.
Another nail sticks to the first nail.
See! another nail sticks to the second nail.
The magnet draws a nickel, but it does not draw a dime.
A penny does not stick to the magnet.
A magnet does not draw a pin. The magnet draws a needle.
The magnet draws things made of iron and steel.
But it does not draw things made of copper, nor things made of silver, nor things made of brass.
Here are some iron filings on a card.
Let us hold the magnet under the card.
Oh, see! are the filings alive?

Is there a fairy in the magnet?
What is it that draws the iron and steel?



Magnetic curves.

Why does it not like the copper and silver?

Now put some paper around the magnet, then put it into the iron filings.

See them stick to the paper! Do they want to get to the magnet?

Tell me, little fairy, how can you draw the iron?

I can not tell you; you must find out.

ABOUT METALS.

Iron is heavy. It is hard.

Steel is harder than iron. Iron is gray.

Steel is not so dark as iron. Steel is made of iron.

Iron is a metal. Gold and silver are metals.

Gold is yellow. Silver is white. Copper is red.

My ring is made of gold. My pin is silver.

Silver and gold and copper are used for money.

What picture is there on a half dollar?

The metals are dug out of the ground.

A gold mine is a place where gold is dug.

What is an iron mine?

Tin is a white metal. Pans are made of tin.

Zinc is darker than tin.

It is not so hard as tin.

Which is harder, nickel or copper?

Iron and steel will rust.
Copper and silver will tarnish.
Which metal is the most useful?

THE ROBIN.

I saw a robin this morning.
Spring must be coming.
How does the robin know that spring is near?
The robin is a happy bird. He sings "Cheer up, cheer up!"
The robin was in the warm south land all winter.
He finds worms to eat there. I think he finds some berries too.
The robin builds his nest in our trees, if we do not drive him away.
He makes the nest of mud and grass; he puts hair on the inside.
Why does he put the hair in the nest?

The robin eats worms and fruit. He likes our cherries.

I want him to have some of my cherries. He gives us a sweet song for them.

Robin and nest.

Did you ever see a robin pull a worm out of the ground?

He can see a worm far away.

I like the robin. He does not quarrel. He sings sweetly, and is kind and jolly.

I like to see the robin hop in the yard. I never drive him away.

The robin has a fine red breast. Did he get it from the morning sun?

We call him robin redbreast.

HOW THE ROBIN GOT HIS RED BREAST.

A long time ago a robin met a pretty dove in the forest.

The dove was very proud. It walked back and forth and said to the robin: "Look at me. See my pretty pink feet and my shining feathers.

My feathers are purple and blue and green.

Don't you wish you had as pretty a dress as I have?"

But the robin only piped: "Cheer up, cheer up; my dress is dull, I know, but it is good enough for me. Cheer up, cheer up. Men will not love my dress, 'tis true; but I will sing them a happy song, and they will love me for what I do. Cheer up, cheer up."

So early every morning little robin flew into the top of a tree and sang his sweet song with his face to the sun.

"You dear little bird," said the sun, "you are so kind and happy I will paint your breast with the prettiest red."

This is the way, I think, dear robin got his red breast.

THE PUSSY WILLOWS.

Oh! oh! what are those? They look like little pussy-cats. They are gray and so soft. Don't they look like babies in hoods? I think so.

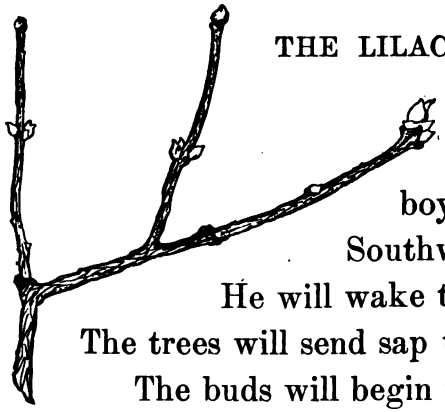
Did you ever think that there are cradles in the trees? The little twigs are cradles. The little brown buds are babies. The wind rocks them all winter long. The buds sleep in their brown coats and keep warm.

He who made all things cares for them. He tucks them in snugly, so that Jack Frost can not hurt them.

In March the golden sun sends the warm

winds to kiss the baby buds and awaken them.

Then the buds begin to peep out of their tiny houses. Pretty soon they put out their little heads. The warm drops of rain tap, tap on the little brown houses, and wake up the buds. The pussies grow to be catkins. By and by there will be young leaves, and then grown leaves, laughing in the sunlight and rustling in the breezes.



Winter buds.

THE LILAC.

One day in spring the boys said: "Mr. Southwind is here. He will wake the trees. The trees will send sap to the buds. The buds will begin to swell."

Then the boys ran to the lilac bush. They cut off a few twigs and put them in a glass of water in their room.

The buds grew bigger every day. Did the water make them swell?

How did the water get into the buds? Is the stem hollow?

The stem has pith in the center. Around the pith is wood.

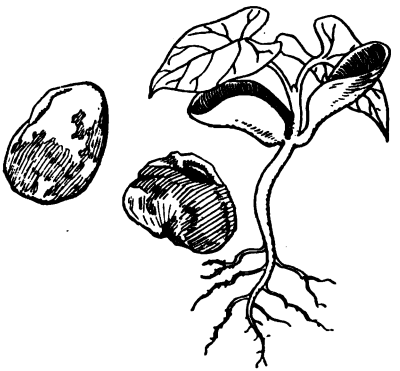
The wood is covered with two coats. I can find the coats.

Spring buds.

Can you tell what color the coats are?
See! there are always two buds together.
One is on one side of the stem, and another is on the other side.
That is not so in the apple or in the cherry tree.
Can you find other trees that have the buds together like the lilac?
There are two kinds of buds on the lilac —a leaf bud and a blossom bud.
I think the blossom bud is bigger than the leaf bud. Don't you?
These buds will soon be flowers.
There will be ever so many flowers in one bunch.
I like to smell the lilac flower.
Can you find the flower bud on the apple tree?
The lilac is not a tree, it is a shrub.

THE BEAN.

Once there were some beans in a box.
They wanted to get out to grow.
They seemed to feel that the warm sun was ready to help them.


Beans.

A little girl came and took out a handful of beans. She put some into water and the rest into warm ground. The little beans were so happy.

They began to swell. The little girl took one out of the water. She began to pick it to pieces. The bean had two coats.

She found a spot where the bean had been

fast to the pod. She found the parts of the bean. She saw a baby plant at one side of the two parts. The baby was very small. What was its color? Can you tell why it is not green?

The bean did not like to be picked apart, for it could never grow now like its sisters.

The little girl watched the other beans. In three days she saw a little foot come out of the scar. She soon found it was the tiny root.

In a week there was a stem, with the two parts of the bean on the top of it.

The two parts of the bean were the food for the little plant. They are called the seed leaves. All the parts are hard at work. The tiny roots go down into the ground. They suck the water from the ground for the plant. The roots hold the plant fast

in the ground. They are busy down in the dark ground. The stem holds the leaves up in the air. The leaves have very small mouths on the under side. They breathe for the plant.

I planted one bean last spring. It grew and had blossoms.

New pods came on it. It grew to be a vine. It climbed around a stick.

Can you tell which way it went around the stick? Does the vine follow the sun around the stick? Can you make it go round the other way?

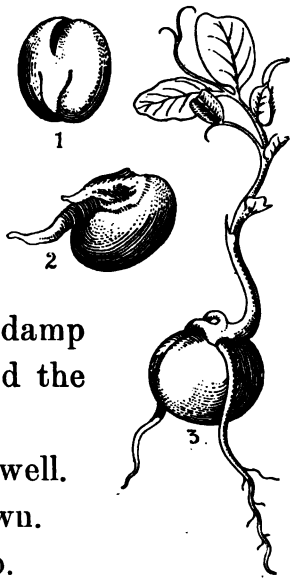
The vine had blossoms. Oh, so many! Then it had sixteen pods. Some of the pods had six beans in them. Some had five beans, and some had seven.

THE PEA.

We put some soil into a box.

Then we put some peas into the soil, and set the box in the warm sun.

What does the seed need to grow? It needs soil, water, light, heat and air. We put a little water on the soil every day.



Peas.

The warm sun and the damp soil soon awakened the little seeds.

Each seed began to swell.

A little root grew down.

A little stem came up.

The little root likes to go down into the dark ground.

It drinks in water and food for the stem.

The little stem is made to grow upward.
It likes the sun.
How does it know where the sun is?
Do you think it feels the sun?
The seed leaves did not come up on the stem like those of the bean.
They gave food to the roots and the stem.
Which has more roots, the pea or the bean?
I think the pea can feed itself sooner than the bean can.
That is why it has smaller seed leaves.

Corn.

The stems grew very fast. They became vines.
They sent out little tendrils.
The tendrils wanted to help the plant.
The vine is too weak to stand up.
So the tendrils hold on to the dry sticks.
They are very glad to do this for the vines.
By and by the vines had blossoms.
The pea blossom is very queer.
Don't you think it looks like a hood?
Is it like the bean blossom?
What color is the sweet pea blossom?
Soon the blossom became a pod.
It had five little peas all in a row.
Do you think the little peas like to stay in their green house?
When did they come out?

SALT.

Here are two lumps of salt.
One of the lumps is rock salt.
The other is table salt.
Can you break the rock salt with your fingers?
Once I put water into three big bottles.

Then I put a lump into each bottle.
The three lumps were salt, alum and borax.
After awhile the lumps were gone.
Did the water break the salt apart?
The tiny drops of water are hard workers.

They did what I could not do with my fingers.

What became of the salt?

I tasted the water.

It was salty.

The salt was in the water, but I could not see it.

We say the salt is dissolved and the bottle contains a solution of salt.

Then I put some of the solution in a tin pan and set it over the lamp.

The water boiled. It changed to vapor.

There was something left in the tin pan.

What do you think it was?

I had the salt back again.

I can do the same thing with the alum and the borax.

Then I set the three bottles with the rest of the water in the bookcase.

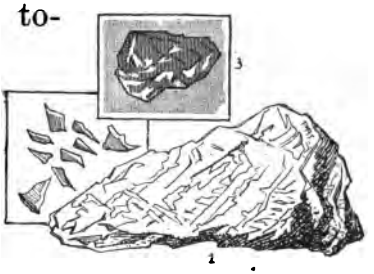
In a few days I saw a little lump in the bottom of the borax bottle.

It was oblong in shape.

It was a pretty borax crystal.

The borax came together again and made the crystal.

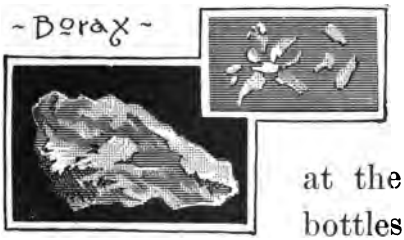
There were also crystals around the top of the bottles.



Crystals of alum.

The salt crystals were not like the alum crystals, and the alum crystals were not like the borax crystals.

Each kind had its own shape.



The crystals in the bottom were larger than those at the mouth of the bottles.

I also dissolved other things.

I found that they dissolve faster in warm water than in cold water.

They dissolve faster when the lumps are small and when the water is stirred.

When I set them in a quiet place many pretty crystals formed in each glass.

THE CRAYFISH.

The crayfish has two pinchers. He can pinch your fingers.

He can hold my pencil. See me lift him with the pencil.

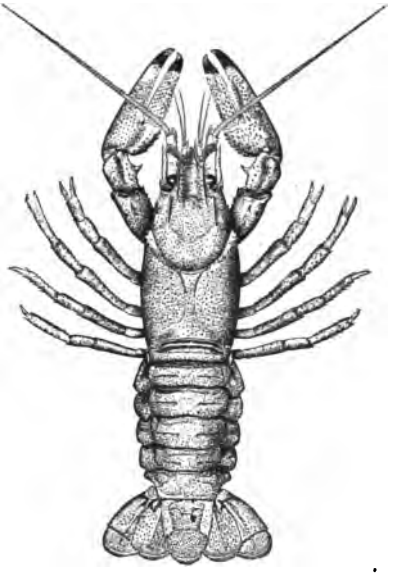
How many legs has he—eight or ten?

The two front legs are very strong. Why are they called pinchers?

The crayfish fights with his pinchers. Sometimes the pinchers are pulled off, but others soon grow.

I saw a crayfish fight with a turtle. A boy had them both in a tub of water. After a while the crayfish caught the turtle by the front foot with his

pinchers and pulled him about in the water. He pinched the turtle so hard that it opened its mouth as if it were calling for help.



The crayfish.

His legs are like sticks tied together. Under his body are little legs. These little legs help the crayfish in swimming. The mother crayfish holds her eggs with them.

Did you see the young cling to the under side of the crayfish? How do they do it?

The crayfish can live on land or in wa-

ter. He does not like dry and dusty ground.

I kept one in a basket a long time. He tried ever so hard to get out.

He swims with his tail. Watch him do it.

He can move backward and forward and sideways.

I think the little ones can swim faster than the old ones.

The crayfish has little black eyes. They are on little pegs or stalks.

When he wants to see far he pushes the pegs out.

I could not make the crayfish close his eyes. His eyes are open under the water. Can he shut them?

The mouth of the crayfish is like a small tube. It has teeth on the sides.

The teeth are very small. The crayfish chews sideways, and not up and down.

He has no upper nor lower jaw. He has a right and left jaw. Isn't that queer?

He has two long feelers. Near the mouth are two soft foot jaws. With these he takes hold of his food.

I see tiny holes near his mouth. The water comes out of these holes. I think he breathes through them. The crayfish does not breathe by gills, like the fish.

Do you think the crayfish can hear? I saw many holes in the ground near the water. Some boys call them snake holes.

I think they are made by crayfishes.

Can you see the marks of the crayfish's tail on the sides of the hole?

I think the hole is the home of the crayfish.

Can the crayfish live in dry ground?

THE EARTHWORM.

I.

One morning I went into our back yard.
It had rained the night before.
I walked along the smooth path.
There I saw many little heaps of fresh earth.
These heaps were not there the evening before.
How did they get there?
I took the heaps away carefully.
I found a little hole in the ground under them.
I dug down a few inches and found a worm in the hole.
The boys call it a fish worm.
I dug up a number of them.
Some were only an inch from the top of the ground.
Others had gone down much farther.

The sides of the hole were smooth.
These wormholes are called burrows.

II.

Next I put a dozen worms on a white plate.
Some were only two inches long.
The largest were six inches in length.
Their bodies felt moist.
At first they crawled about on the plate.
When the plate became dry I put a few drops of water on it.
The worms seemed to like this.
The poor little worms can not live long on the dry plate.
Then the plate was set in the sun. How beautiful!
The colors were like those of the rainbow.
The sun lighted up their bodies.
I could almost see through them.
I saw a dark streak under the back.

It reached from one end of the worm to the other end.

The back was a darker red than the under side.

III.

Now I took one of the worms in my hand.

It tried to get away.

I was very careful not to hurt it.

It moved first one way and then another.

Its body was made of rings joined together.

Each ring seemed to be in two parts.

The top and bottom look alike.

I turned it on its back, but it turned itself over again.

I pulled a worm gently between thumb and finger. I felt little points beneath the skin.

They were on the under side of the body.

I think the worm uses these bristles under the skin for feet.

They are like stilts.
Which is the head end?
Both ends seem to be alike.
The worms crawl backward or forward.
If we look sharply we may see two small lips at one end.
These lips form the mouth.
They are of tough skin.

IV.

What does the earthworm eat?
I tried to find out what he eats.
I went into the garden.
Two large trees stood near the end of the garden.
Many leaves had fallen from the trees.
They were scattered over the ground.
The worms had made many burrows under these leaves.
Most of the leaves were eaten around their edges.

Bits of the leaf covering were also nibbled off from some of the leaves.

I have never seen worms nibble fresh green leaves.

They will do no harm if they do not eat the green leaves of the plants.

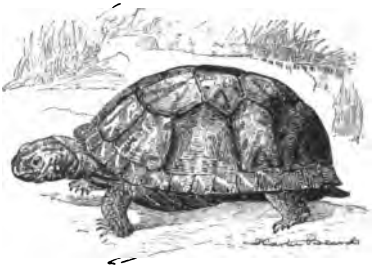
They do much good.

Some other time I will tell you how they do it.

TURTLES.

This is a land turtle. It has a beautiful shell.

The shell is hard. It is five inches long and four inches wide.



Land turtle.

Some turtles are three feet long. The large turtles live in the sea.

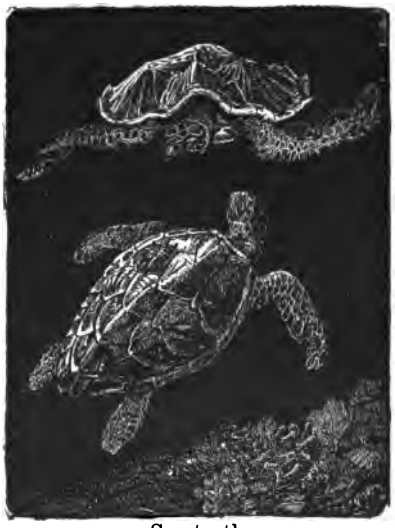
The shell of our turtle is round on the top and flat below.

It has lines on the under side. Has the shell parts? How many parts has it?

Is the shell the turtle's coat or his house?

He can draw his head and feet into the shell and close it up.

Do you think that is why we call it a box turtle?



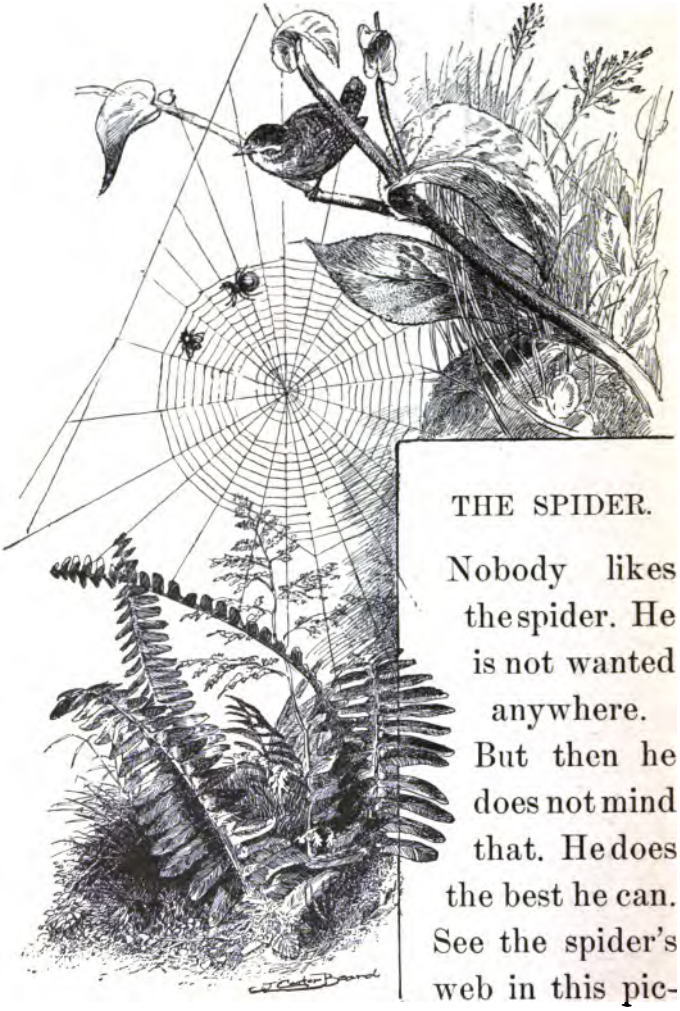
Sea turtles.

Why does the turtle have the strong shell?

He can not run fast. He can not get out of the way of harm very well.

Does the rabbit need a shell? Why not?

The turtle drags his shell on the ground. Can you tell how he does it?



THE SPIDER.

Nobody likes the spider. He is not wanted anywhere. But then he does not mind that. He does the best he can. See the spider's web in this pic-

ture. Isn't it a beautiful one? Can you find one like it?

Did you ever watch the spider make a web? I did. I think he is a wise workman and never makes a mistake.

The thread he spins is finer than any that man ever made.

This spider spun the long threads first. He started from the branch of a tree and let himself down to some ferns. Here he fastened a thread. Then he went up on the first thread with a second one. Did he do this to make it stronger, do you think? He made all the long threads in this way. Then he went to the center, and from there carried a thread to the upper corner. He next drew one from this limb to the center. He kept on in this way until he had made all those from the center. Then he started from the

center and carried threads around in a circle until the web was finished.

Do you think it looks like a wheel? I wonder if all spiders put the same number of spokes in their webs.

When the web was done, the spider hid himself in it under a leaf. Why did he do this?

I watched until a fly flew against the web. His feet got fast in it. He said, "Buzz, buzz," but he could not get away. Then the spider ran across the web to sting him.

I found five dead flies in one web, and nine in another.

Does the spider live on flies? Of what use is the web? Do you think the spider is cruel?

There are many kinds of spiders. Some have a very pretty dress. There is a kind of spider that makes its house in the ground. He digs a round hole in

the earth about three inches deep. Then he makes a door to cover it. This door he fastens at one point with many webs. They form a sort of hinge. He can open and shut this door as he pleases.

I know a nice little story about a spider. Shall I tell it to you?

Once a fly got fast in a spider's web.

The spider ran to sting the fly. Just then a bird caught the spider.

The fly said, "Buzz, buzz." Is that the way a fly says "Thank you"?

Soon after a boy tried to shoot the bird with his gun. The fly buzzed into the boy's eyes so hard that he could not take aim, and the bird got away.

The bird saved the fly, and then the fly saved the bird.

THE END.

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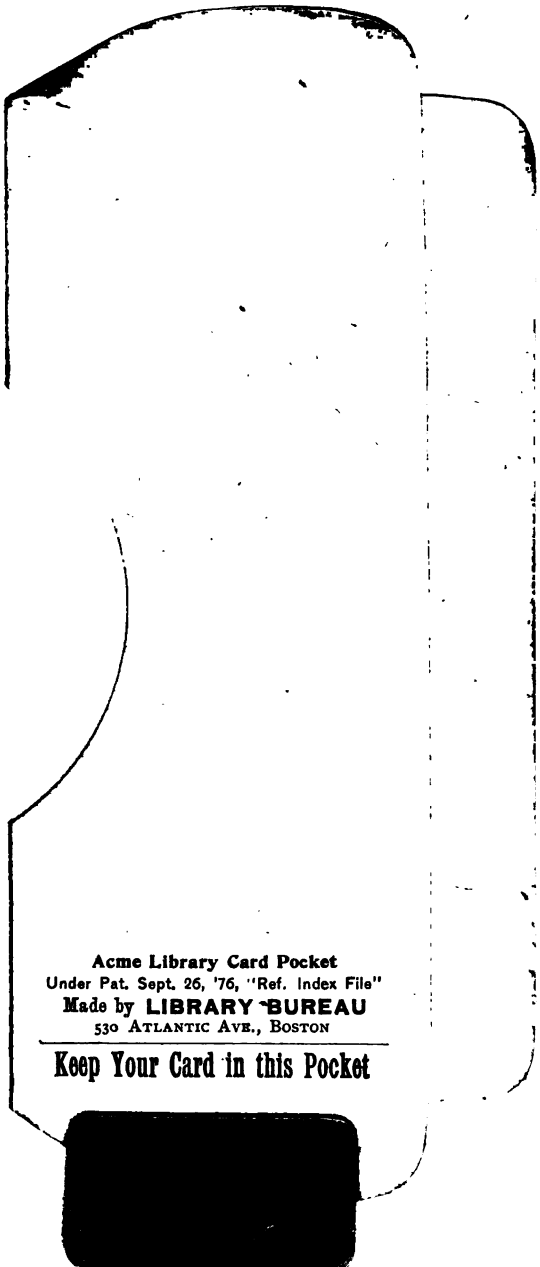
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